MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2016/2017

PBM0045 – MATHEMATICS

(Foundation in Management / Foundation in Business)

12 October 2016
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 3 pages with **FOUR** questions.

2. Attempt **ALL** four questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.

Question 1

a. Solve the equation: $\frac{2x}{x-3}+\frac{6}{x+3}=\frac{-28}{x^2-9}$ (5 marks)

b. Solve the equation by making an appropriate substitution.

$$2x^{2/3}+7x^{1/3}-15=0$$ (5 marks)

c. Solve for: $|x-10|=x^2-10x$. (6 marks)

d. Find the domain for the following functions:

i. $f(x)=\frac{13}{x^3-4x}$ (2 marks)

ii. $g(t)=\sqrt{6+t-t^2}$ (5 marks)

e. Marina wants to run a tutoring program during the school holidays. She comes up with the following profit function:

$$f(x)=x^2-6x+2$$

where x represents the price of the program. Find the vertex of this function. (2 marks)

(Total = 25 marks)

Question 2

a. Find the first three terms of the arithmetic sequence whose 11^{th} and 23^{rd} terms are -15 and -51, respectively. (8 marks)

b. Evaluate $3\begin{bmatrix}-1 & 2 & 1\\ 1 & 3 & 0\end{bmatrix}^T\begin{bmatrix}-1 & 3 & 2\\ 1 & 2 & 2\end{bmatrix}-\begin{bmatrix}-2 & 2 & 4\\ 4 & -1 & 7\\ 3 & -5 & -9\end{bmatrix}$. (5 marks)

c. Let $A=\begin{bmatrix}1 & 1 & -1\\ 2 & -3 & 1\\ 2 & 1 & 2\end{bmatrix}$ and $C=\begin{bmatrix}-7 & -2 & 8\\ -3 & 4 & 1\\ -2 & -3 & -5\end{bmatrix}$.

i. Find the inverse of A if C is the **cofactor matrix of A**. (5 marks)

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ii. Hence, using the results from part (i), solve the following system of linear equations.

$$\begin{aligned} x+y-z&=1\\ 2x-3y+z&=0\\ 2x+y+2z&=5 \end{aligned}$$

(7 marks)

(Total = 25 marks)

Question 3

a. Find the $\frac{dy}{dx}$ for the following functions. Simplify the answers.

i. $y=3x^{10}+(2x-3)^5$ (2 marks)

ii. $y=\left(\frac{x+6}{x^2+5x}\right)\div\left(\frac{1}{x+5}+1\right)$ (4 marks)

iii. $y=\frac{(2x+1)^2}{(x^2+2)}$ (6 marks)

b. Given $y=\frac{1}{4}(x^2-2)^2(x^2-2)^4$. Find an equation of the tangent line at $x=2$.

(7 marks)

c. The cost c of producing q units of a product is given by

$$c=0.1q^2+6q+1000.$$

If the price per unit p is given by the equation $q=500-1.5p$, use the **chain rule** to find the rate of change of cost with respect to price per unit $\left(\frac{dc}{dp}\right)$ when $p=50$. (6 marks)

(Total = 25 marks)

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Question 4

a. Evaluate each of the following integral:

i. $\int \left(x^2(3\sqrt{x} - x^{-\frac{1}{2}}) - \sqrt[5]{x^2} + 8 \right) dx$ (5 marks)

ii. $\int \frac{\left(x^{-1/3} + 1\right)\left(2 - x^{-3/2}\right)}{x^{1/3}} dx$ (5 marks)

iii. $\int_1^2 \frac{5x}{\left(3x^2 - 2\right)^2} dx$ (7 marks)

b. A company incurs debt at a rate of

$$D'(t) = 90(t + 6)\sqrt{t^2 + 12t}$$

ringgit per year, where t is the amount of time (in years) since the company began. By the **fourth year**, the company had accumulated RM16,260 in debt. Find the total debt function, $D(t)$. (8 marks)

(Total = 25 marks)

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